Source : www.thehindu.com Date : 2023-09-10

SCIENTISTS GROW A MODEL OF HUMAN EMBRYO IN THE LAB

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September 09, 2023 09:15 pm | Updated 09:15 pm IST

Due to ethical reasons and technical challenges, studying human post-implantation development has been limited. The closest that scientists have come to understand intrauterine development after implantation is by using mouse naïve embryonic stem cells (ESCs) that gave rise to embryonic and extra-embryonic stem cells capable of self-assembling into mouse structured stem cell-based embryo models at the post-gastrulation stage. It is at this stage that the embryo differentiates into the three primary founding tissue types of the body. But for the first time, researchers were able to extend the findings from mouse to humans by using genetically unmodified human naïve embryonic stem cells. The results were published recently in *Nature*.

The researchers were able to develop a “complete” model of the human embryo in the lab from implantation into the uterus to 14 days after fertilization. The model mimics the 3D structure and key hallmarks of post-implantation human embryos up with all the known features found in normal embryos around two weeks old.

Known as stem cell-based embryo-like structures, or SEMs, they were developed without using sperm, eggs or a womb. According to the researchers at the Weizmann Institute of Science in Israel, the models secreted a hormone that turned a commercial pregnancy test to positive.

The authors note that their model recreates the organization of all known lineages and compartments of early post-implantation human embryos, including the epiblast, hypoblast, extraembryonic mesoderm and trophoblast. Unlike previous models, this model shows defining hallmarks of integrated embryo models, including all lineages of the post-implantation embryo and structural organisation.

“We observed proper spatial allocation of cell lineages into defined embryonic and extra-embryonic compartments in the complete absence of fertilisation or interaction with maternal tissues and without the need of providing external targeted signalling pathway induction during the self-organisation of the aggregated cells,” they write.

“This SEM platform may enable the experimental interrogation of previously inaccessible windows of human early post-implantation up to peri-gastrulation development,” they add.

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